

CLAIMS

1. 1. A device for dithering a three-color source image, comprising:
 2. a first logic for dissecting a color space of said source image into a plurality of tetrahedrons each having four vertices;
 3. a second logic for locating one of said tetrahedrons that contains a point corresponding to a value of a pixel of said source image;
 4. a third logic for generating a random number as a threshold value for dithering said pixel of said source image;
 5. a fourth logic for assigning a probability density corresponding to each of said vertex of said located tetrahedron;
 6. a fifth logic selecting a vertex as an interim output provided by said threshold value through an inverse probability distribution function derived from said probability densities of said vertices; and
 7. a sixth logic for locating an output point in an output color space corresponding to said selected vertex.
8. 2. A device for dithering a source image according to claim 1, wherein said first logic that dissects said color space further comprises:
 9. a first logic for truncating said value of said image pixel of said source image, for locating a 3-dimensional cubic subinterval containing said point; and
 10. a second logic for further dissecting said 3-dimensional cubic subinterval into a plurality of tetrahedrons.
11. 3. A device for dithering a source image according to claim 1, wherein said logic for generating a random number is a 2-dimensional array of pseudo-random numbers overlaying on top of said source image.

1 4. A device for dithering a source image as recited in claim 1, further comprising a seventh
2 logic containing one-dimensional look-up tables for converting an 3-component input colorant
3 value into said pixel value.

1 5. A device for dithering a source image as recited in claim 1, wherein the device is
2 embedded in a central processing unit in a computer system.

1 6. A device for dithering a source image as recited in claim 1, wherein said device is
2 embedded in a processor in an output device.

1 7. A device for dithering a source image as recited in claim 6, wherein said output device is
2 a printer.

1 8. A device for dithering a source image as recited in claim 6, wherein said output device is
2 a display monitor.

1 9. A method for dithering a three-color source image, comprising the steps of:
2 dissecting a color space of said color image into a plurality of tetrahedrons each having
3 four vertices;
4 locating one of said tetrahedrons that contains a point corresponding to a value of a pixel
5 of said source image;
6 generating a random number as a threshold value for dithering the said pixel value of said
7 source image;
8 assigning a probability density corresponding to each of said vertex of said located
9 tetrahedron;
10 selecting a vertex as an interim output provided by said threshold value through an
11 inverse probability distribution function derived from said probability densities of said vertices;
12 and
13 locating an output point in an output color space corresponding to said selected vertex.

1 10. A method for dithering a source image according to claim 9, wherein said method that
2 dissects said color space comprises the further steps of:

3 truncating said value of said image pixel of said source image, for locating a 3-
4 dimensional cubic subinterval containing said point; and

5 further dissecting said 3-dimensional cubic subinterval into a plurality of tetrahedrons.

1 11. A method for dithering a source image as recited in claim 9, further comprising the steps
2 of:

3 converting an input colorant value into said pixel value through one-dimensional lookup
4 tables, prior to said step of locating a tetrahedron.

1 12. A method for dithering a source image according to claim 9, wherein the step of
2 generating a random number includes the step of fetching a pseudo-random number from a 2-
3 dimensional threshold array overlaying on top of said source image.

1 13. A device for dithering a source color image via weighting coefficients associated with a
2 plurality of sample points in a source color space of said source color image, comprising:

3 a first logic for generating said weighting coefficients of said sample points, wherein said
4 weighting coefficients are probability densities of said sample points;

5 a second logic for generating a random number as a threshold value for dithering a pixel
6 value of said source image;

7 a third logic selecting a point from said plurality of said sample points provided by said
8 threshold value through an inverse probability distribution function derived from said weighting
9 coefficients of said points; and

10 a fourth logic for locating an output point in an output color space corresponding to said
11 selected point.

1 14. A device for dithering a source image according to claim 13, wherein said logic for
2 generating a random number is a 2-dimensional threshold array overlaying on top of said source
3 image.

1 15. A device for dithering a source image as recited in claim 13, further comprising a fifth
2 logic containing look-up tables for converting an input colorant value into said pixel value.

1 16. A device for dithering a source image as recited in claim 13, wherein the device is
2 embedded in a central processing unit in a computer system.

1 17. A device for dithering a source image as recited in claim 13, wherein said device is
2 embedded in a processor in an output device.

1 18. A device for dithering a source image as recited in claim 17, wherein said output device
2 is a printer.

1 19. A device for dithering a source image as recited in claim 17, wherein said output device
2 is a display monitor.

1 20. A method for dithering a source color image via weighting coefficients associated with a
2 plurality of sample points in a source color space of said source color image, comprising the
3 steps of:

4 generating said weighting coefficients of said sample points, wherein said weighting
5 coefficients are probability densities of said sample points;

6 generating a random number as a threshold value for dithering a pixel value of said
7 source image;

8 selecting a point from said plurality of said sample points provided by said threshold
9 value through an inverse probability distribution function derived from said weighting
10 coefficients of said points; and

11 locating an output point in an output color space corresponding to said selected point.

1 21. A method for dithering a source image according to claim 20, wherein the step of
2 generating a random number includes the step of fetching a pseudo-random number from a 2-
3 dimensional threshold array overlaying on top of said source image.